DOCUMENT RESUME

ED 215 337 CS 006 654

AUTHOR Sanza, James
TITLE Category Priming in the Lexical Decision Task and Evidence of Repetition Effects.
PUB DATE Mar 82
NOTE 9p.; Paper presented at the Annual Meeting of the Southeastern Psychological Association (28th, New Orleans, LA, March 24-27, 1982).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adults; *Cognitive Processes; *Decision Making; Memory; Reading Comprehension; *Reading Research; *Semantics; Tachistoscopes; *Word Recognition
IDENTIFIERS *Repetition Effects; *Semantic Priming

ABSTRACT

Semantic priming is the process by which a subject performing a lexical decision task is prepared for a target word through the presentation of a semantically related word. Repetition of a given word at specific intervals is one form of priming that has been shown to reduce subject reaction time in word recognition tasks. A study was conducted to explore repetition as a form of priming and to determine whether it affects the same stage of lexical processing as does semantic priming. Subjects were 52 native English speaking adults who were instructed to concentrate on making rapid lexical decision responses by pressing appropriate keys as they looked into a three-field tachistoscope. The subjects were told to expect to see a fixation guide on the first field, followed by a word that might help them make their responses to the letter string that would appear in the third field. They were also told that on some trials they would not be given a priming word prior to the letter string, but would instead see a row of X's, which were intended as neutral primes. Results showed that items that had been presented once with a prime and later without a prime were responded to as rapidly as when they were primed, indicating that a repetition effect had occurred. Overall results indicated that priming and repetition affected a common processing stage, that of memory retrieval. (FL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED215337

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

Category Priming in the Lexical Decision Task

and

Evidence of Repetition Effects

James Sanza

Georgia State University

Presented at the

Southeastern Psychological Association

28th Annual Meeting

New Orleans, LA

March 24-27, 1982

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

James Sanza

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CS006654

In the lexical decision task the subject must rapidly indicate whether a visually presented string of letters forms a real word or a non-word. Lexical decision experiments are usually structured so that on any one trial, the subject cannot anticipate whether the upcomng letter string will be a real word or a non-word. The lexical decision is a very simple task because the subject is not required to make judgments about the meaning of the word. The lexical decision task can be used to explore relations among concepts in semantic memory. This can be done because the lexical decision task is sensitive to semantic context variables. A subject's reaction time to a given word can be reduced by 30-60 msec if he is first shown a word that is semantically related to the word to which he is to respond. This procedure is called priming. For example, it takes a subject 550 msec to decide that the word peach is a real word; another subject primed with the word fruit will take 50 msec less to respond to the same word. Presenting the word fruit makes the word peach more accessible to the subject for the purpose of making a response.

The mechanism by which priming has been generally thought to occur is in terms of perceptual bias. Meyer and Schvaneveldt (1971), who pioneered some of the lexical decision research, adapted Morton's (1970) logogen model in order to explain priming effects. They assume that an array of word detectors exists in lexical memory which responds to the sensory features of a word stimulus. Each detector maintains a count of the stimulus characteristics which match the characteristics of the word represented by the detector. Once a criterion number of features has been counted by a given word detector, the detector is activated above a threshold, and the word is recognized. The effect of a semantically related prime word is to provide semantic features to the array of word detectors. The semantic features are treated in much the

same way as sensory features extracted from a word stimulus. A word detector counts those semantic features that are appropriate to the meaning of the word represented by the detector. The count of semantic features is accumulated by the same mechanism used to accumulate sensory features. The effect of a semantic prime is to raise the initial feature count in semantically related word detectors above their normal resting level. Thus, fewer stimulus features are needed for the recognition of a semantically primed word, than for an unprimed word. Since the feature extraction process presumably operates in real time, it is possible to characterize priming effects in terms of shorter reaction times.

The length of time that a given word detector remains sufficiently activated to produce priming has not been firmly established. It would seem that there should be a predictable decay time of this activation from trial to trial, but there is evidence that word detectors remain activated for very long periods. Scarborough, Cortese and Scarborough (1977) found that in a simple (unprimed) lexical decision task, repeating the presentation of a given word a second time in a session results in a 60 to 80 msec savings in reaction time on the second presentation. Furthermore, this repetition effect can be measured across sessions two days apart. In the context of the present discussion, the repetition effect can be construed as a form of priming, in which the word detector of a given word remains activated throughout the session, and this activation facilitates the recognition of that word, when it is presented again in the same session.

The purpose of the present experiment was to explore the repetition phenomenon as a form of priming and to try to determine whether it affects the same stage of processing as does conventional semantic priming. Sternberg (1969) proposed that mental processes in reaction time tasks can be

conceptualized as a series of relatively independent stages of processing. On the basis of his and other experimenters' data, he proposed four stages of processing that seem applicable to the present task; these are: stimulus encoding, memory search, binary decision, and response translation. It is possible that the repetition effect may occur in any of the stages of this model. Sternberg's additive-factors method provides a way to pinpoint the stage of processing involved. The logic of this method requires that there be variables that produce selective effects on particular stages. To determine whether repetition of a stimulus affects retrieval from lexical memory, it is necessary to show that some other variable that affects lexical retrieval interacts with repetition. One likely candidate is semantic priming. If semantic priming and repetition are variables affecting a common stage of processing, they should produce interactive effects. If repetition and semantic priming affect different stages of processing their effects should be additive.

In addition, this experiment is designed to generate support for the contention that category names can facilitate lexical decision responses made to good exemplars of categories which are not highly associated with the category names. Most lexical decision studies interested in context effects have used words whcih are highly associated (such as bread and butter), but few if any experiments have explored the possibility of using the lexical decision task as a tool for tracing hierarchical relations among concepts in semantic memory. A category priming effect of this kind would support the notion developed in sentence verification experiments, that concepts in semantic memory share category relations with other concepts (Rips, Shoben & Smith, 1973).

The following procedure was used to test the above hypothesis. Fifty-two native English speaking subjects were instructed to concentrate on making rapid lexical decision responses by pressing appropriate telegraph keys as they looked into a 3-field tachistoscope. They were told to expect to see a fixation guide on the first field, followed by a word that might help them make their responses to the letter string that would appear in the third field. They were told that on some trials they would not be given a priming word prior to the letter string, but that instead they would see a row of three X's. The X's were intended to serve as neutral primes. The subjects received 50 practice trials using stimuli comparable to those used in the experimental session. The stimuli of interest used during the session consisted of 10 category names which served as primes for 10 exemplars which were ranked as the third or fourth best examples of their category according to the Battig and Montague (1969) norms of category membership. Exemplars rated first or second were not used in order to minimize the strength of association that might exist between them and their respective category name.

Subjects were assigned to one of two groups. In one group, the items primed with categories occurred in the first part of the session before the same items appeared unprimed later in the session. In the other group the unprimed items occurred in the first part of the session and the same items appeared with primes later in the session. An average of 30 intervening items were presented between the first and second presentations of any one item of interest. There was a total of 60 trials in the session which included non-word trials.

The reaction time data from the primed and unprimed items of interest were analyzed in a 3-factor fixed model analysis of variance in which Priming and Words were treated as within-subjects variables, and Repetition was

treated as a between-subjects variable. The relevant interaction between Priming and Repetition was significant at the .01 level. A planned comparison t-test indicated tnat there was a significant 47 msec difference in reaction time between the primed and unprimed items which had not yet been repeated. This was taken as evidence of category priming. With respect to the relations between priming and repetition, items which had been presented once with a prime when later presented again without a prime, were responded to as rapidly as when they were primed, indicating that a repetition effect had occurred on the unprimed items. A planned t-test comparison of items which had been primed on the first presentation, and items primed on the second presentation, was not significant. If repetition and priming affect different stages of processing, these effects should have been additive, and a greater savings in reaction time should have occurred for those items which were primed when repeated. Since both priming and repetition effects occurred, and these effects were not additive, but instead were interactive, it is concluded that priming and repetition affect a common processing stage, that of memory retrieval.

Figure 1 summarizes the results.

References

Battig, W. R., & Montague, W. E. Category norms for verbal items in 56 categories: A replication and extension of the Connecticut category norms. Journal of Experimental Psychology Monograph, 1969, 80 (3, pt. 2).

Meyer, D. E., & Schvaneveldt, R. W. Facilitation in recognizing pairs of words: Evidence of a dependence between retrieval operations. Journal of Experimental Psychology, 1971, 90, 227-234.

Morton, J. A functional model of memory. In D. A. Norman (Ed.), Models of human memory. New York: Academic Press, 1970.

Rips, L. J., Shoben, E. J., & Smith, E. E. Semantic distance and the verification of semantic relations. Journal of Verbal Learning and Verbal Behavior, 1973, 12, 1-20.

Scarborough, D. L., Cortese, C., & Scarborough, H. S. Frequency and repetition effects in lexical memory. Journal of Experimental Psychology: Human Perception and Performance, 1977, 3, 1-17.

Sternberg, S. The discovery of processing stages: Extensions of Donder's method. Acta Psychologia, 1969, 30, 276-315.

	1	2
Prime first	508	511
Prime second	555	510

presentation

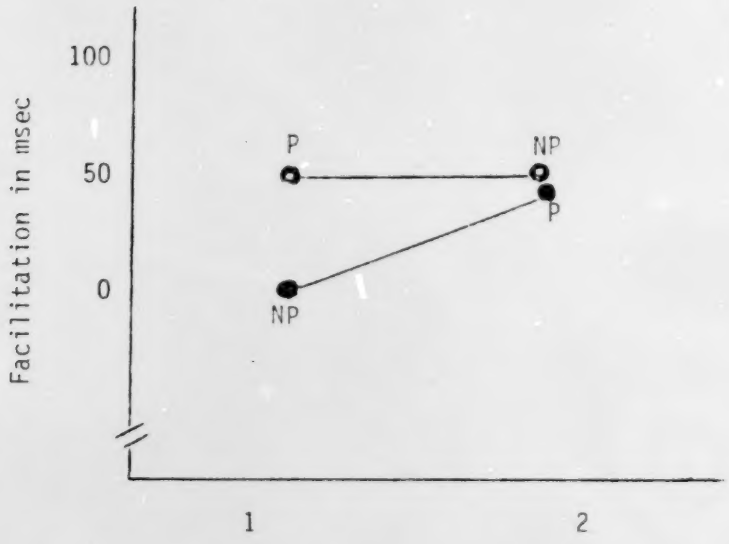

Figure 1. Interaction of facilitation effects due to repeated presentation of target words during a session and effects due to semantic priming by category words. P = presentation of target with semantic prime. NP = presentation of target without prime.